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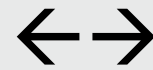
Adaptation-Mitigation Interactions in Agriculture: Identifying Conflicts & Synergies

Chris Stokes & Mark Howden
NCARFF, Gold Coast, June 2010

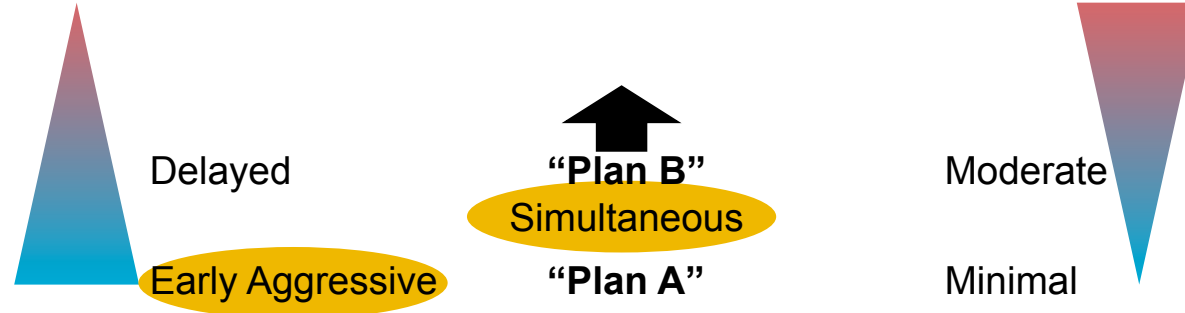
National Research
FLAGSHIPS
Climate Adaptation



Mitigation



Adaptation



Action:

Mitigation

Adaptation

Effect:

Unintended



Goal:

Reduced Emissions
(impacts & exposure)

Environment

Reduced Vulnerability
(coping with change)

Anticipate and minimize conflicts
Maximize synergies

Adaptation & Mitigation Options

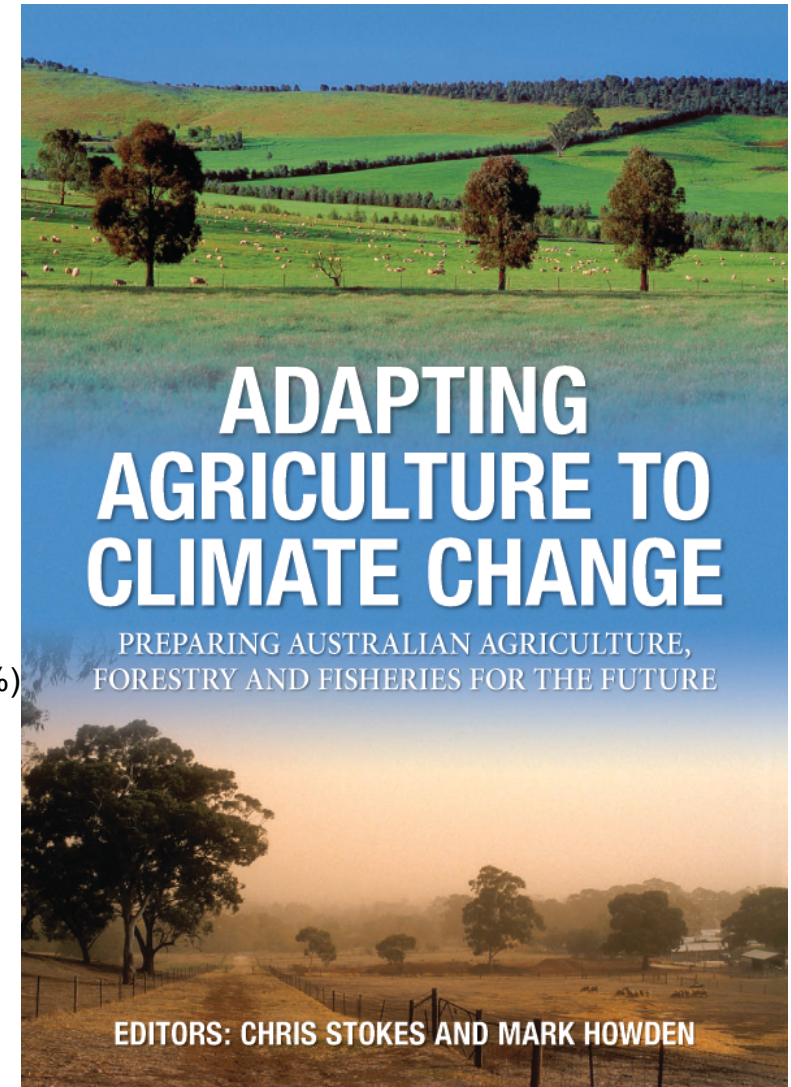
- **Adaptation Options**

- On-farm incremental
- On-farm transformation
- Regionally co-ordinated
- Knowledge gaps / R&D
- Policy, process and capacity

- **Mitigation Options**

- Reduce emissions: CH₄ (13%) & N₂O (4%)
- Carbon sequestration (wood & soil)
- Fossil fuel substitution
- Non-agricultural (inputs & processors)

- **Consequences/Interactions?**



Adaptation Consequences

	Implications for >>	GHG	Env
On-farm Incremental Changes			
Coping with risk & uncertainty : seasonal forecasts, opportunistic planting		=	+
Nutrient management : maintain plant quality and efficient N use (fert, legumes, var.)		=	+
Water use efficiency : improved irrigation , planting practices, cropping systems		(-)	+ (-)
Cooling (animals, animal waste, hort.): shade structures, ventilation, air conditioning		(-)	=
Monitoring : Routine record keeping of weather, pest and diseases, inputs & outputs		=	=
Modifications (timing, spacing, varieties) to improve yield, quality, and resource use		=	=
Transformation			
Land use/location change & diversification : cost/benefit analyses, improve water use efficiency/profit, incentives and support for early adopters		?	?
Product diversification : identify options, consumer flexibility, develop new markets, renewable energy		(+)	?
Co-ordinated Regional Actions			
Pest & Weeds : regional integrated pest management, predictive tools, monitoring, quarantine, fire		(-)	=
Transport & Infrastructure : water distribution, water recycling, harvest logistics, locations of processors, transport networks		?	=

Adaptation Consequences (cont.)

	Implications for >>	GHG	Env
Knowledge Gaps / R&D			
Climate forecasts & scenarios : combine trend & seasonal forecast, industry specific metrics, improved GCMs		=	=
Process understanding (CO ₂ , temp, rainfall, seasonality): effects on crops, animals, pests, water, fire		=	=
Breeding : for changes in CO ₂ , heat tolerant, drought tolerant, water use efficient changes in seasonality		=	=
Cost/benefit of robustness of farming to CC with & without adaptation measures (enterprise .. global scales & regional variation)		=	=
Decision support tools : climate impacts, adaption options, seasonal forecasts		=	=
Policy, Process & Capacity			
Interactions & participation : policy, science, managers		=	=
Capacity : communication, resourcing & incentives, uncertainty, capacity building		=	=
Mainstreaming CC considerations: especially water, drought, NRM, biodiversity, GHG		+	+
Monitoring, evaluation & adaptive learning : climate, knowledge of impacts, effectiveness of actions (& why)		=	=
Water : effective water trading, incorporate CC into planning/allocations, flood risks		=	+
Food marketing & distribution to reduce waste		+	+

Mitigation Consequences

	Implications for >>	Adpt	Env
Reduce CH₄ Emissions			
Ruminant livestock (herd management, diet quality, rumen modifiers)		(+)	(+)
Reduce savanna fires (CH ₄ & N ₂ O)		(=)	(+)
Reduce N₂O Emissions			
Efficient fertilizer management		+	+
Manage water logging (drainage & irrigation)		=	+
Manure management		=	+
Carbon Sequestration			
Improved soil management & rehabilitation		(=)	+
Savanna trees (thickening & reduced clearing)		(-)	=
Agro-forestry		+/-	=
Fossil Fuel Substitution			
Biofuels (ethanol & biomass burning)		+/-	=
On-farm renewable energy generation		=	=
Product substitution		+/-	?
Indirect			
Cost-price squeeze (higher input & processing costs)		-	(-)

Conclusions

- **Adaptation conflicts**
 - fire, active cooling, fertilizer use
- **Mitigation conflicts**
 - cost-price squeeze
 - diversion of agriculture land/produce/resources to renewable energy
 - and C sequestration
- **Synergies**
 - improved resource use efficiency (water, nutrients, livestock)
 - reinforces many Best Management Practices
 - reduced food waste
- **Overall**
 - Adaptation largely neutral for mitigation and reinforces good NRM (pre-filtered)
 - Mitigation has some impacts on ability to adapt
 - Build GHG budgets into Adaptation analyses
 - and future climate scenarios into Mitigation analyses

Climate Adaptation Flagship

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Thank you

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